Iowa Department of Transportation Winter Maintenance Program

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Iowa Department of Transportation

Winter Maintenance Overview

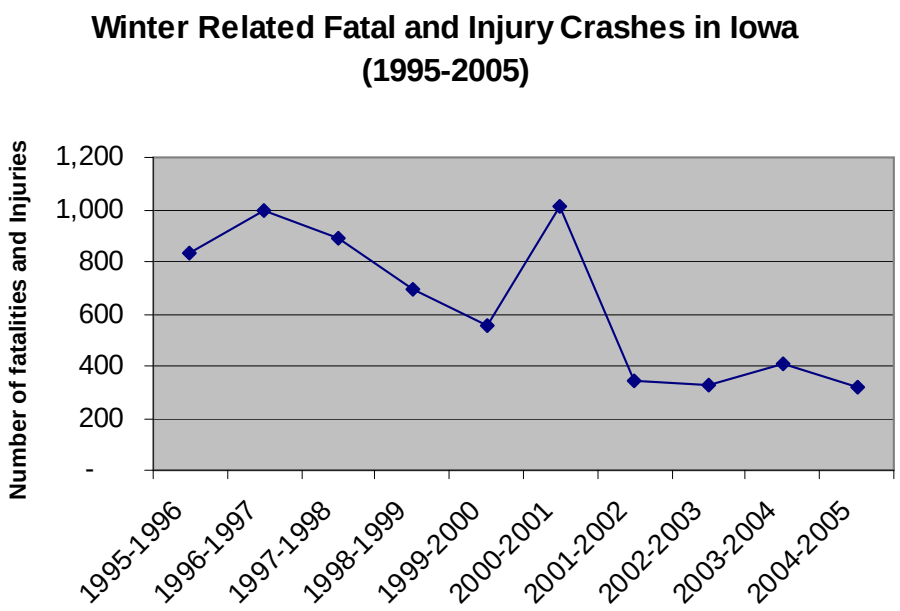
- 24,867 lane miles of roadway
- 3,975 lane miles (includes ramps) of Interstate highway
- 6 Districts
- 901 Snowplows
- 1,200 operators, supervisors and mechanics
- 110 maintenance facilities
- 200,000 tons of covered salt storage (some shared facilities with cities and/or counties)
- $38 million snow/ice budget

Current Fleet

- 901 trucks (60% tandem axle-40% single axle)
- International 7000 series (60,000# GVW and 35,000# GVW)
- Target Life- 15 years (purchase 60 each year)
- Actual Life- nearing 20 years (based on purchase of 45-50 per year for the last 2-3 years)

Truck costs (equipped with plow, wing and spreader):

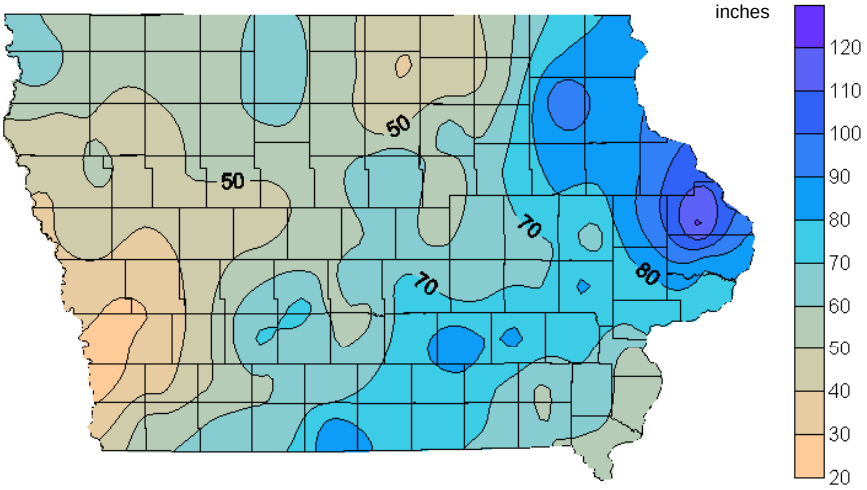
Medium Duty Truck	Heavy Duty Truck
2008- $95,000	2008- $113,000
2010- $119,000	2010- $135,000



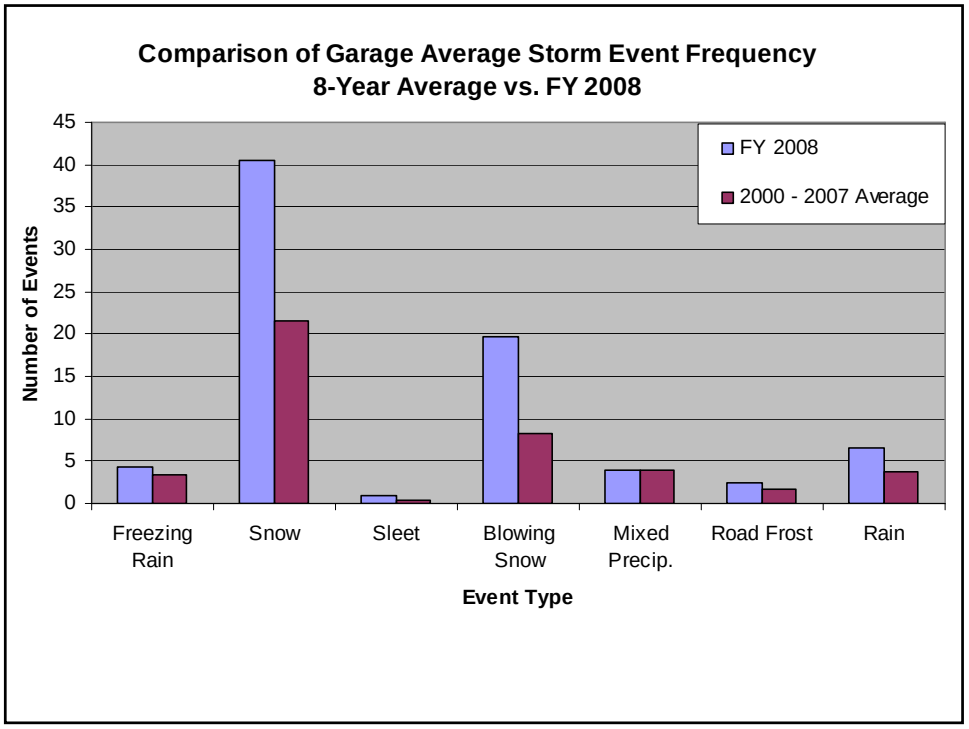
2007-2008 Winter Weather

- Snowiest season since 2000-2001
- 10th snowiest winter in 121 years of records
- Statewide average snowfall- 45.1 inches (85+ inches of snow in Dubuque area) compared to a normal winter of 32 inches
- First 4 months of year the coldest since 1982

2007-2008 Snowfall

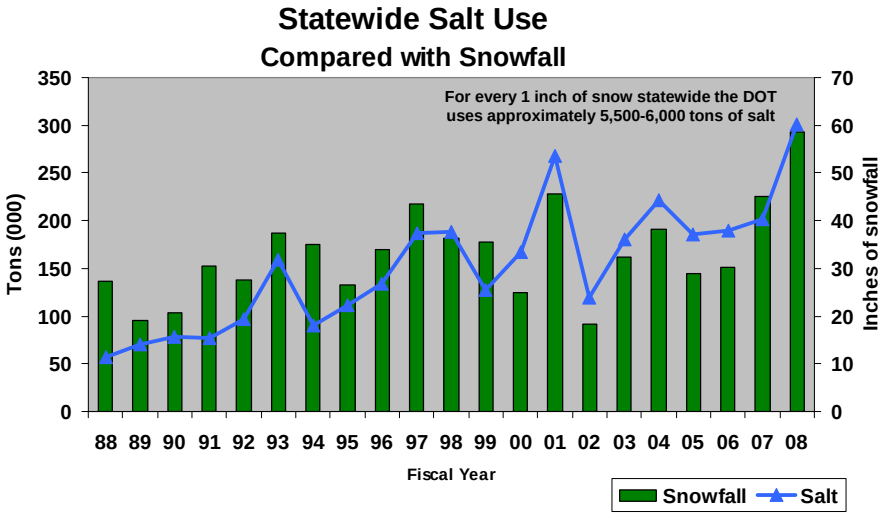


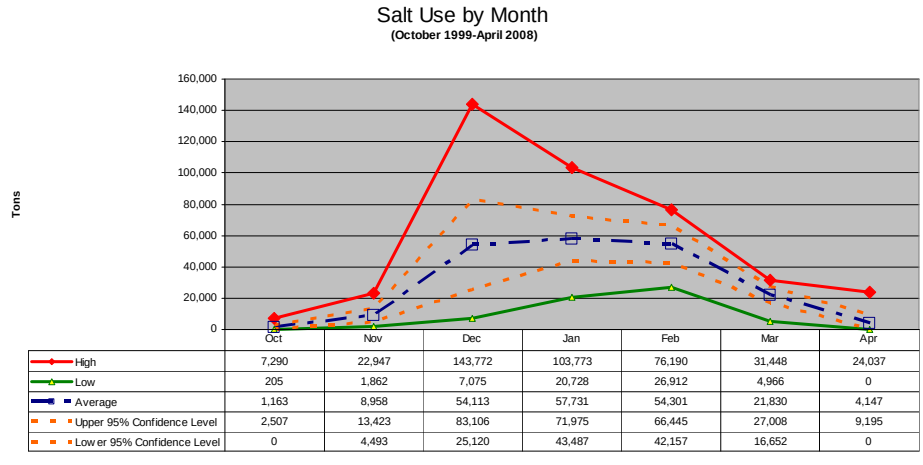
As reported by Maintenance Supervisors



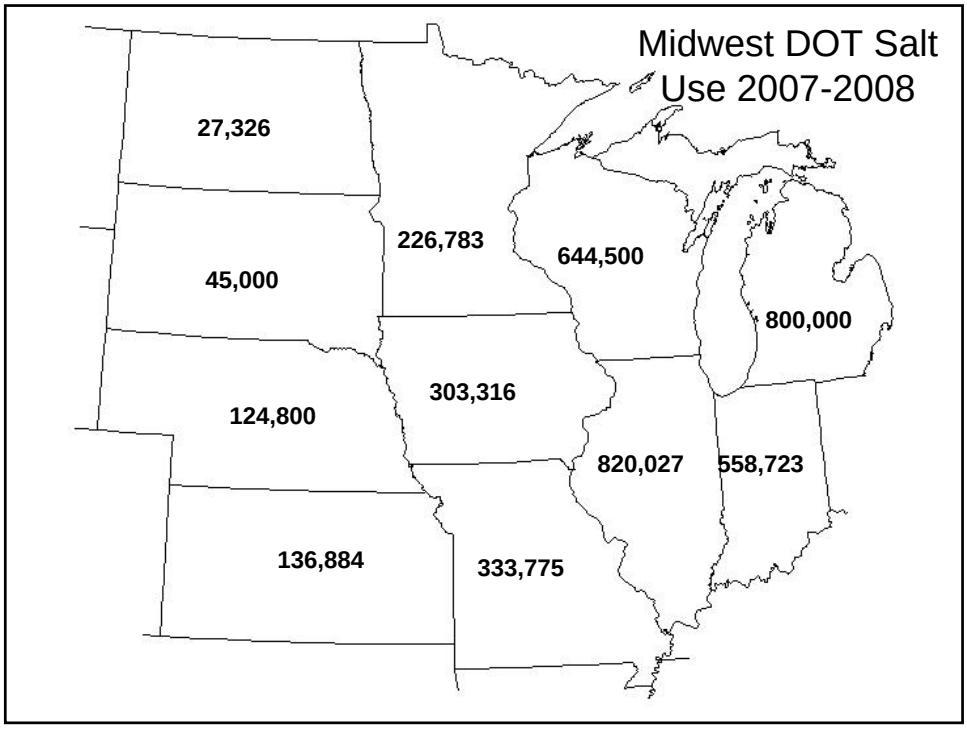
2007-2008 Material Use

- Salt- 303,316 tons (new record)- previous record 248,000 tons during the winter of 2000-2001 (10 year average annual use-196,000 tons
- Salt brine- 15,676,616 gallons
- Sand- 59,959 tons
- Calcium Chloride- 120,850 gallons





	Oct	Nov	Dec	Jan	Feb	Mar	Apr
High	7,290	22,947	143,772	103,773	76,190	31,448	24,037
Low	205	1,862	7,075	20,728	26,912	4,966	0
Average	1,163	8,958	54,113	57,731	54,301	21,830	4,147
Upper 95% Confidence Level	2,507	13,423	83,106	71,975	66,445	27,008	9,195
Lower 95% Confidence Level	0	4,493	25,120	43,487	42,157	16,652	0


Midwest DOT Salt Use 2007-2008
27,326
45,000
124,800
136,884
226,783
303,316
333,775
644,500
820,027
800,000
558,723


Salt Sources in North America
Saskatchewan
Alberta
Manitoba
Montana
North Dakota
California
Nevada
Utah
Colorado
Kansas
Arizona
New Mexico
Oklahoma
Texas
Sonora
Coahuila
Baja California Norte
Mich.
Ohio
Pennsylvania
New York
Maine
New Brunswick
Miss.
Alabama
La.
The Bahamas

Salt Procurement Process

- The Iowa DOT contacts cities and counties in March-April each year by mail to determine if they want to be included in the DOT salt procurement (In 2008, 47 cities, 53 counties and 3 other government entities participated in the DOT bid process)
- In April bids are opened and contracts awarded by location
- In FY 2009 thirty-one Iowa DOT locations did not receive a reasonable bid (first time in history)
- A special letting was held in May for the thirty-one DOT locations but no bids were received

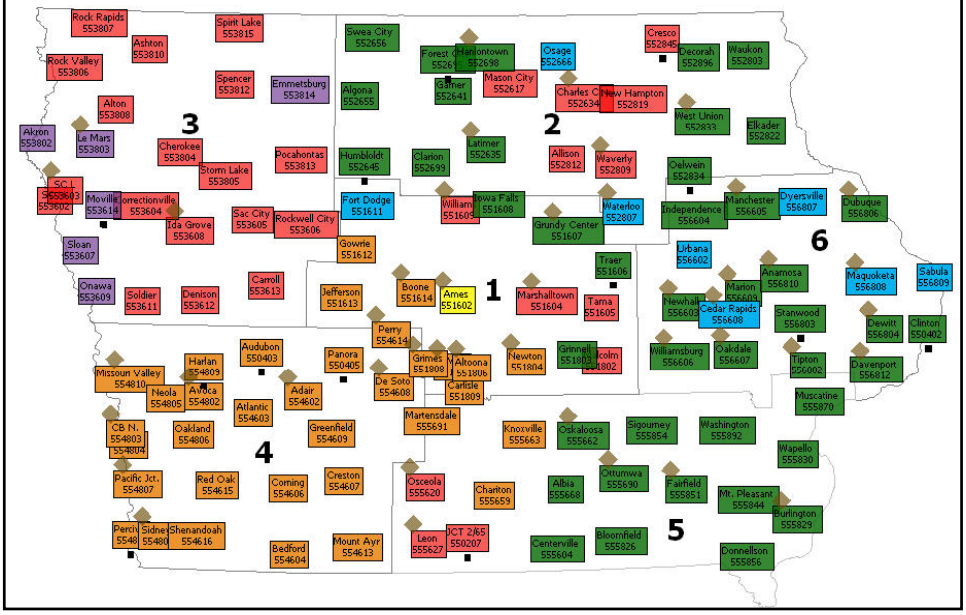
Salt Contract Terms

- The Iowa DOT must order at least 80% of the contract amount and can order as much as 120%
- Vendors are allowed twelve business days to complete deliveries. Late deliveries are assessed a penalty of $1 per ton per day for every day the delivery is late
- A fuel adjustment clause in the contract allows per ton prices to move with the weekly Midwest average diesel fuel prices

Iowa DOT FY 2009 Salt Results

- 248,887 tons ordered on contract (requested 310,000 tons)
- Average statewide price $63 (2007 price= $50 per ton)
- Thirty-one Iowa DOT maintenance garages without salt contracts (locations shown in red on next slide)

DOT Garages Color Coded by Supplier (2008-2009)



Nationwide Salt Shortage

- The severe winter of 2007-2008 resulted in record salt use throughout the nation. The Iowa DOT typically fills salt facilities at the end of the season in preparation for the next season but was unable to find salt leaving the Department 105,000 tons short of capacity
- Flooding on the Mississippi river delayed barge traffic delivering Louisiana salt to Iowa river terminals
- Hurricanes in Louisiana damaged salt mining equipment and delayed shipments
- Record diesel fuel prices contributed to higher prices for salt and fewer return hauls
- The demand for road salt was much higher than what could be produced by North American Salt mining operations

Aid to Cities and Counties

- Surveys were sent to all cities and counties in early August to determine the salt shortage impact on Iowa communities. All 99 counties and 374 cities responded to the survey. Total shortfall statewide was approximately 35,000 tons
- The Iowa DOT has worked with the cities and counties to provide them with some salt to help through the winter season. To date over 5,000 tons has been sold to cities and counties at $70 per ton
- The nationwide salt shortage may extend beyond the current year

Iowa DOT Conservation Efforts

- Increased emphasis on calibration of all material delivery systems
- Increased training on appropriate use of deicing chemicals at all levels
- Increased monitoring
- Emergency plan updated when salt supply drops

Operational Strategies

Anti-icing- application of a liquid deicer prior to or at the onset of a winter storm or frost event

Benefits:

- Keeps the roads drivable at the start of the storm
- Can help prevent a bond from forming between the snow or ice and the pavement
- The most efficient method to deliver small amounts of deicing chemicals (2.2 pounds of salt in a gallon of salt brine)- A typical 50 gallon per lane mile application is equal to 110 pounds of salt

Operational Strategies (continued)

Prewetting dry materials- Applying a small amount of liquid deicer to dry deicers as it leaves the truck

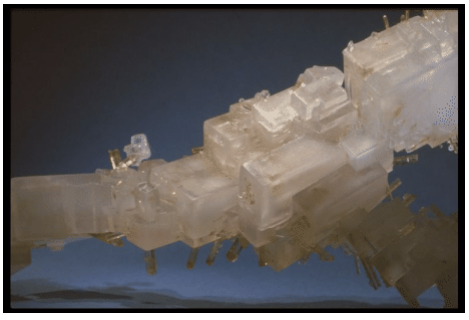
Benefits:

- Jumpstarts the melting process of salt (salt needs heat and moisture to work)
- Helps retain more material on the roadway
- Not easily blown off by traffic or winds

Operational Strategies (continued)

Deicing- If the snow or ice bonds to the roadway surface plowing and application of deicing materials is required to melt through the snow or ice layer

Deicing Chemicals



Deicing Chemicals Used or Tested by the Iowa DOT

- **Sodium Chloride**
- **Sodium Chloride brine**
- **Calcium Chloride (liquid & dry)**
- **Calcium Magnesium Acetate (CMA)**
- **Potassium Acetate**
- **Ice Ban (experimental) with salt brine**
- **Geomelt with salt brine**
- **Ice Slicer**
- **Liquid Corn Salt (LCS)**
- **Activar**
- **Geomelt 55**
- **Mineral Melt**
- **First Down**
- **Clear Lane**
- **All Clear**
- **Caliber**
- **AG 100**
- **Fusion**
- **Sodium Chloride/Calcium Chloride blend**

Deicing Chemical Evaluation Process

- Pre-qualification- vendor provides product literature, chemical composition, MSDS sheet and sample of product
- Chemical analysis conducted by Materials- Environmental impact, chemical composition and others if needed
- Operational test- test in small scale to better understand products capabilities and problems
- Evaluation and recommendation

Salt Application Guidelines

- **NCHRP 6-13 Guidelines for Snow & Ice Control Materials & Methods**
- **TE-28 Manual of Practice**

Salt Application Rate Guidelines Prewetted Salt @12' wide lane (assume 2-hour route)							
Roadway Surface Temp- Fahrenheit		32-30	29-27	26-24	23-21	20-18	17-15
Pounds of Salt	Heavy Frost Mist Light Snow	50	75	95	120	140	170
	Drizzle Medium Snow (1/2" per hour)	75	100	120	145	165	200
	Light Rain Heavy Snow (1" per hour)	100	140	182	250	300	350

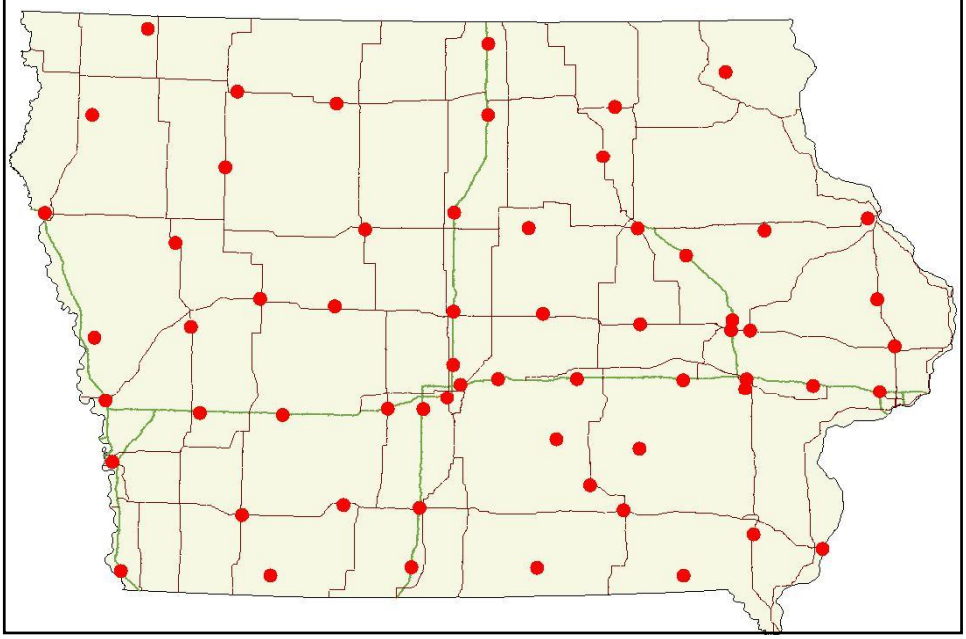
Prewetted Salt @12' wide lane (assume 3-hour route)							
Roadway Surface Temp- Fahrenheit		32-30	29-27	26-24	23-21	20-18	17-15
Pounds of Salt	Heavy Frost Mist Light Snow	75	115	145	180	210	255
	Drizzle Medium Snow (1/2" per hour)	115	150	180	220	250	300
	Light Rain Heavy Snow (1" per hour)	150	210	275	375	450	525

Winter Technologies

Road Weather Information System (RWIS)- 61 sites

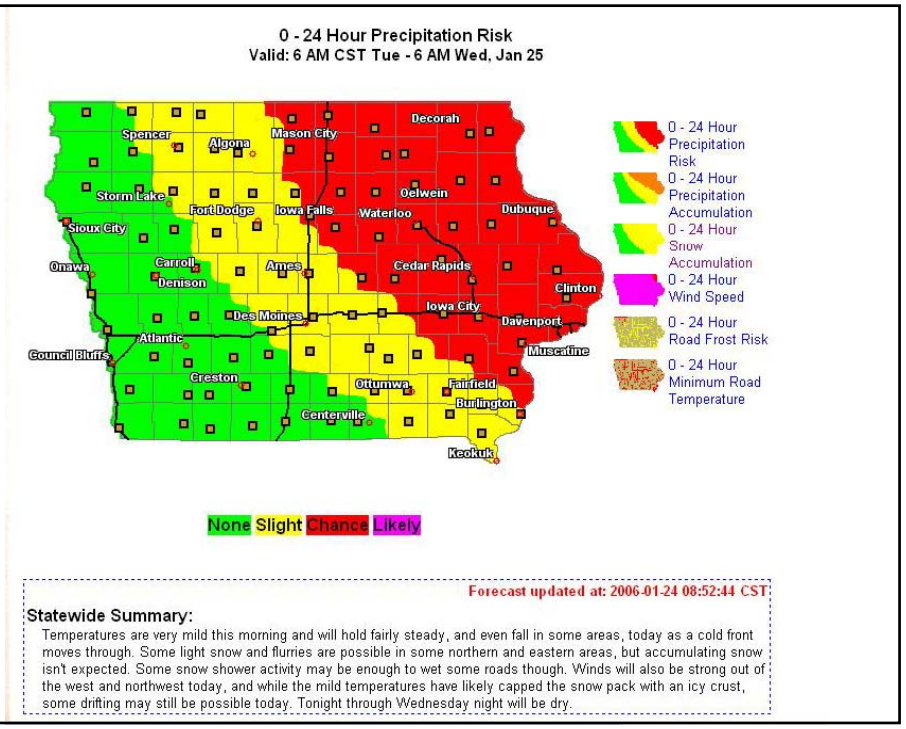
- Wind Speed and Direction
- Air temperature
- Relative humidity
- Precipitation sensor
- Pavement temperature
- Subsurface temperature

Current Iowa RWIS Locations



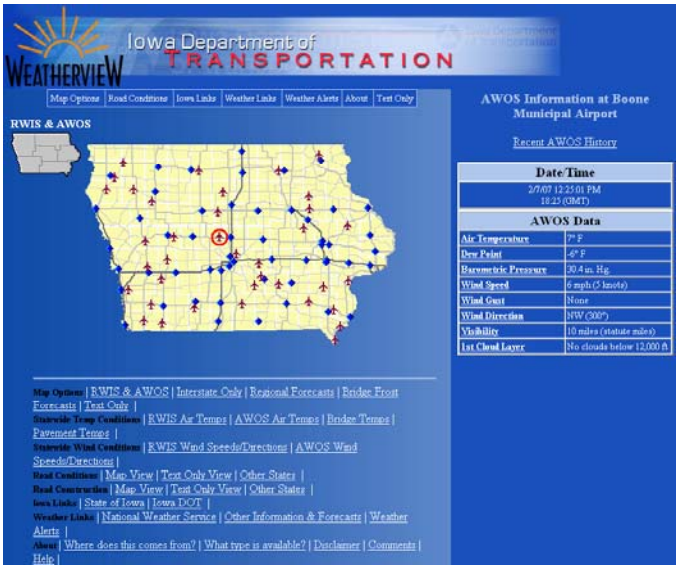
Forecasts

- Custom weather forecasts are provided four times a day by a meteorological service via phone recording, e-mail, Internet and DTN satellite services
- Service also includes a wealth of weather information such as radar, cloud cover, storm path, etc.
- Custom forecasts are also shared with other government entities and the public through the Weatherview web site (www.dotweatherview.com)
- Also includes alerts with 2 hour advance notice provided via cell phone



Weatherview

Weatherview is the DOT's public access to RWIS and Automated Weather Observation Stations (AWOS) information

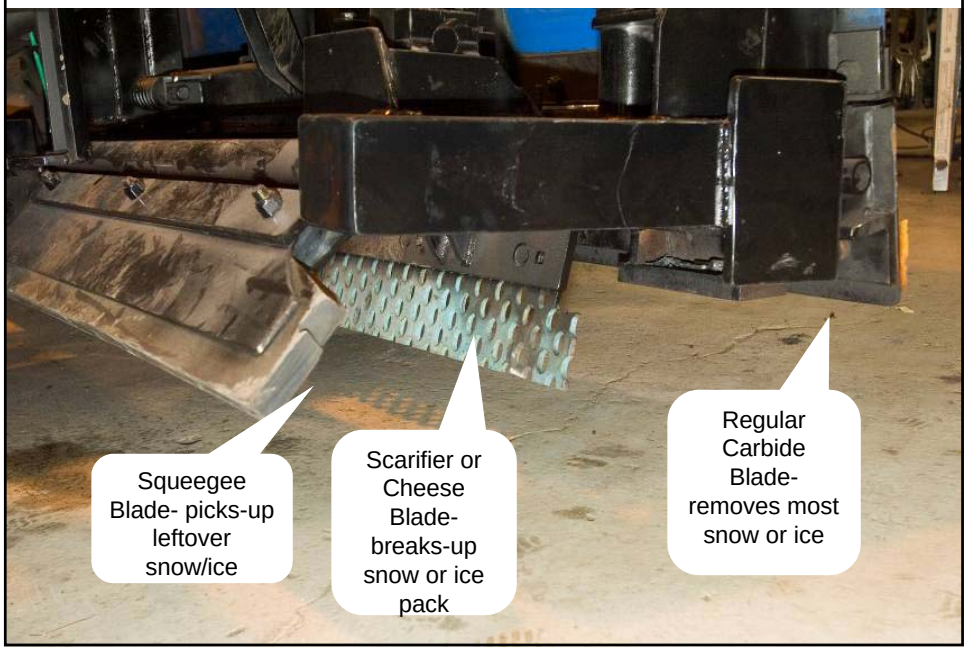


www.dotweatherview.com

Laser Guided Wing Plow

Reverse-a-cast Plow

Multiple Blade Plow



Manufacturer's multiple blade plow prototype for testing in 2008-2009 season

Calibration Scale- developed by the local garage and scale manufacturer in Anamosa to calibrate deicing spreaders

Iowa DOT Snow Fence Program


Questions?

Final FY 2008

Biweekly Winter Update

Apr. 4 to Apr. 17, 2008

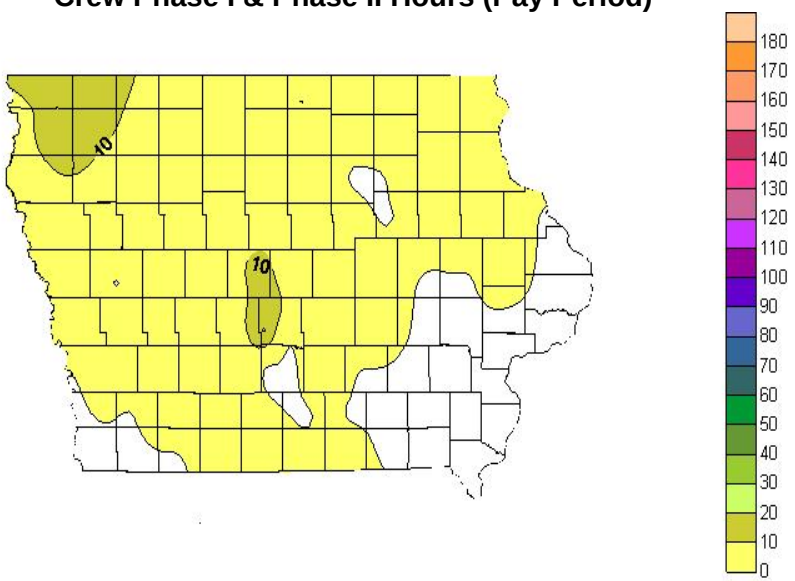
District Summary

	Lane Miles	Salt (tons)		Salt Brine (gals)		Calcium Chloride Brine (gals)		Calcium Chloride Flakes (bags)		Sand (tons)		Total Snow/Ice Hours	
		This Pay Period	YTD	This Pay Period	YTD	This Pay Period	YTD	This Pay Period	YTD	This Pay Period	YTD	This Pay Period	YTD
District 1	4,595	820	56,433	18,465	2,230,913	0	0	0	0	13	6,442	1,810	114,083
District 2	4,030	246	37,861	20,451	2,182,960	0	0	0	927	145	16,144	825	86,377
District 3	3,945	795	31,580	15,860	599,908	0	15	0	0	33	3,237	1,766	67,186
District 4	3,738	425	55,611	4,737	1,219,972	0	83,014	0	0	4	3,910	528	58,098
District 5	4,067	7	47,879	2,535	5,674,043	0	36,873	0	0	0	8,831	594	77,548
District 6	4,318	85	73,952	2,560	3,768,819	0	949	0	173	20	21,395	765	116,339

Statewide Summary

	Salt (tons)	Salt Brine (gals)	Calcium Chloride Brine (gals)	Calcium Chloride Flakes (bags)	Sand (tons)	Total Snow/Ice Hours
Used This Pay Period	2,378	64,608	0	0	214	6,287
Used Year to Date	303,316	15,676,616	120,850	1,100	59,959	522,290
Annual 5 year Average Used	195,890	9,601,274	83,856	614	14,553	307,869
Percent of 5 year Avg Used	154.8%	163.3%	144.1%	179.2%	412.0%	169.6%
Percent of Winter Season Completed	100.0%	**FINAL**				

Crew Phase I & Phase II Hours (Pay Period)*



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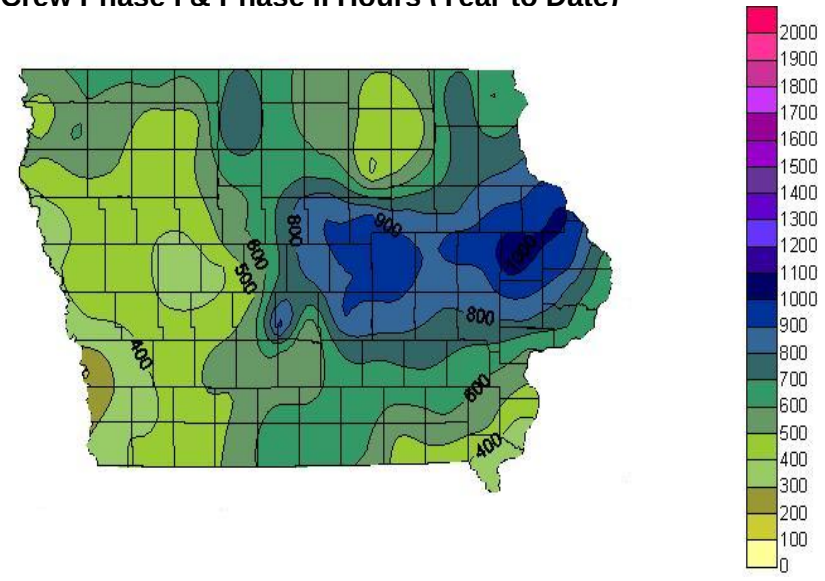
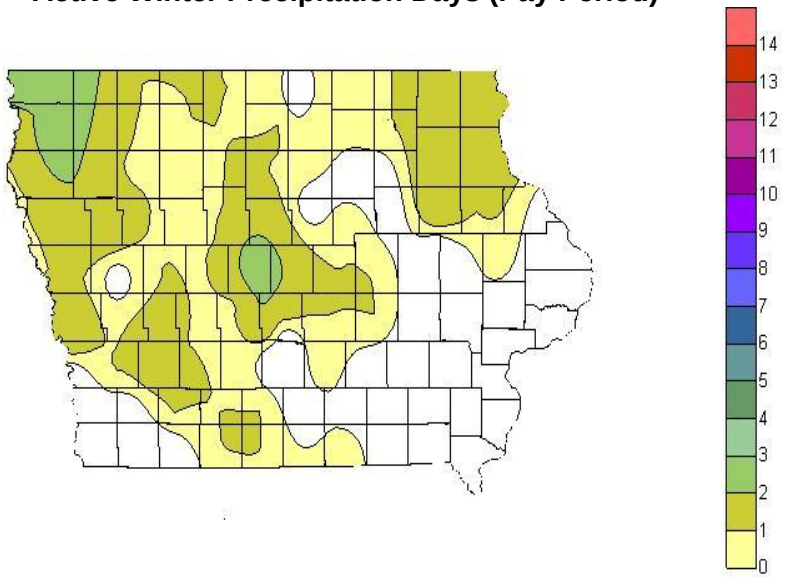


* Duration of Phase 1 & 2 operations.

Active Winter Precipitation Days (Pay Period) *



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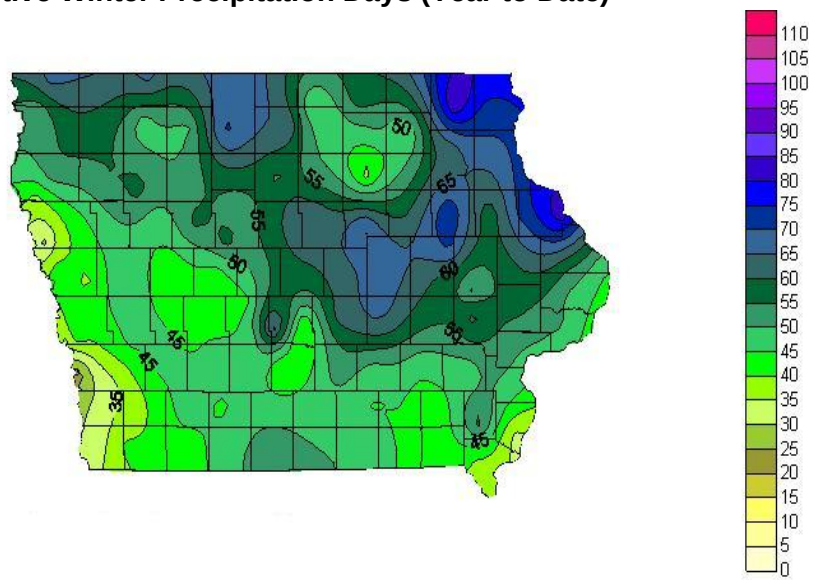
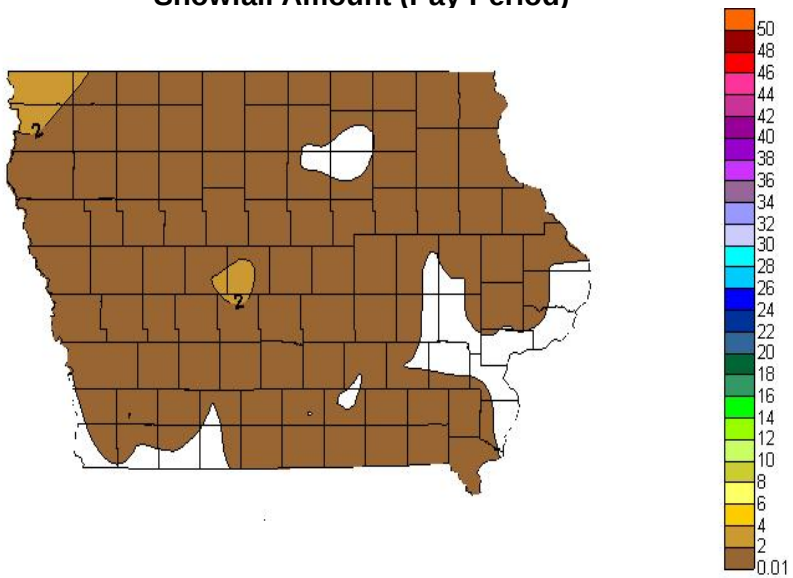


* Number of days in which crews were dispatched for a precipitation event.

Snowfall Amount (Pay Period)



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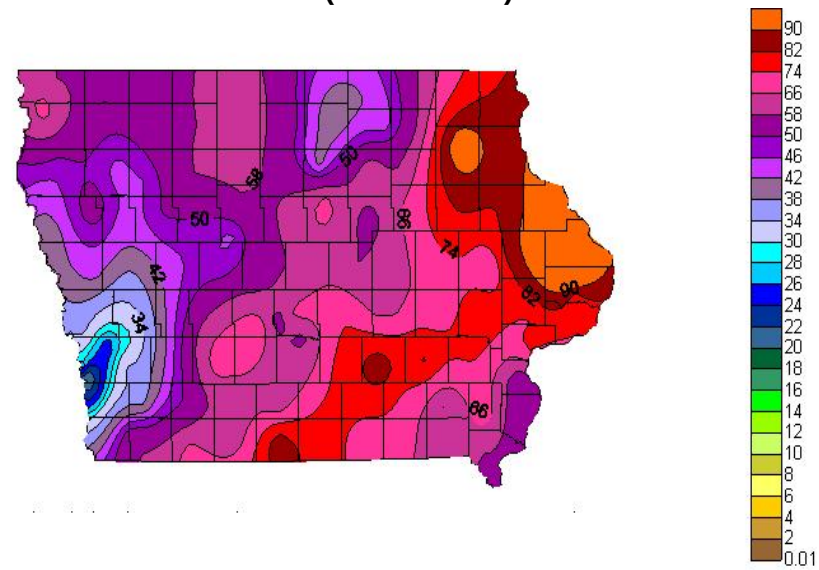


FY 2009

Biweekly Winter Update

Nov. 28 to Dec. 11, 2008

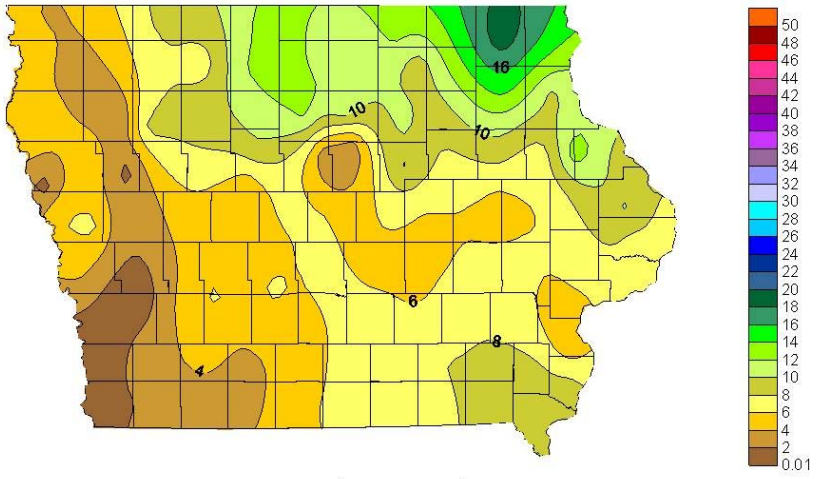
District Summary

	Lane Miles	Salt (tons)		Salt Brine (gals)		Calcium Chloride Brine (gals)		Calcium Chloride Flakes (bags)		Sand (tons)		Total Snow/Ice Hours	
		This Pay Period	YTD	This Pay Period	YTD	This Pay Period	YTD	This Pay Period	YTD	This Pay Period	YTD	This Pay Period	YTD
District 1	4,595	9,583	11,552	450,682	702,080	0	0	0	101	1,118	1,322	14,014	22,845
District 2	4,030	6,099	7,565	338,541	500,220	0	0	492	712	2,280	2,640	11,612	18,012
District 3	3,945	2,863	5,927	76,913	165,555	12	12	0	0	185	386	6,418	12,835
District 4	3,738	5,844	6,694	200,064	245,170	245	245	0	0	153	189	6,110	8,919
District 5	4,067	6,326	6,504	1,142,453	1,202,027	1,323	1,573	0	90	30	30	9,741	14,546
District 6	4,318	11,063	12,125	775,268	861,361	0	35	0	0	1,330	1,389	14,300	18,851

Statewide Summary

	Salt (tons)	Salt Brine (gals)	Calcium Chloride Brine (gals)	Calcium Chloride Flakes (bags)	Sand (tons)	Total Snow/Ice Hours
Used This Pay Period	41,778	2,983,920	1,580	492	5,096	62,472
Used Year to Date	50,367	3,676,413	1,865	903	5,956	96,309
Annual 5 year Average Use	220,487	11,289,004	85,847	571	21,986	312,361
Percent of 5 year Avg Use	22.8%	32.6%	2.2%	158.0%	27.1%	30.8%
Percent of Winter Season Completed	38.5%	5 of 13 winter pay periods completed				

Snowfall Amount (Pay Period)



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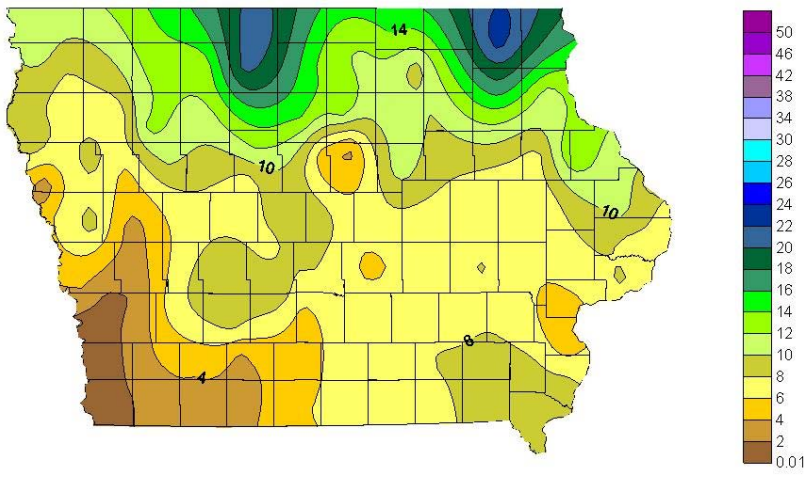

PRELIMINARY 12-11-08

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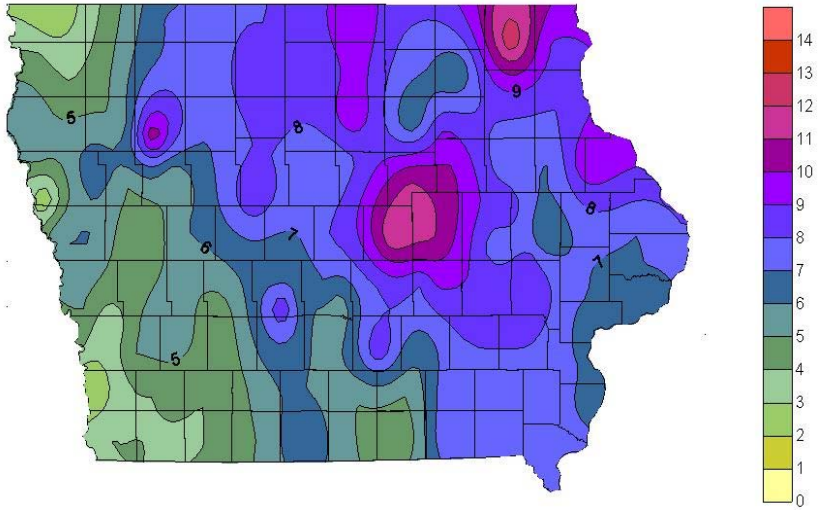

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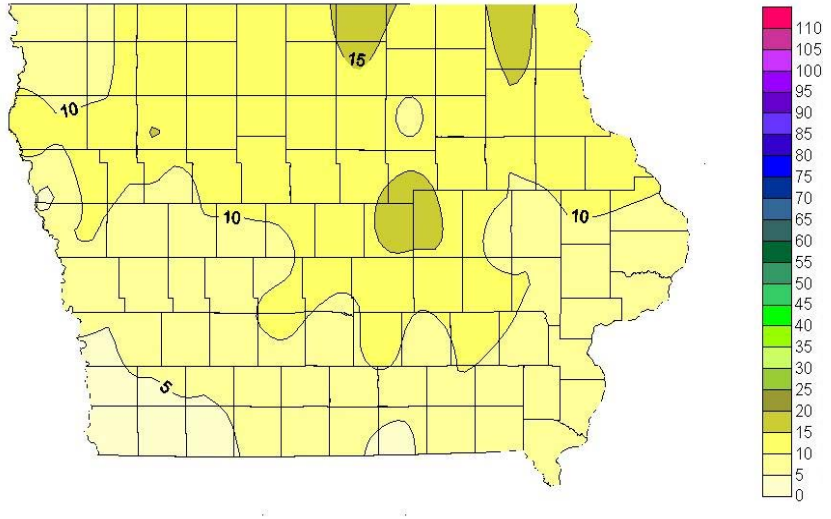

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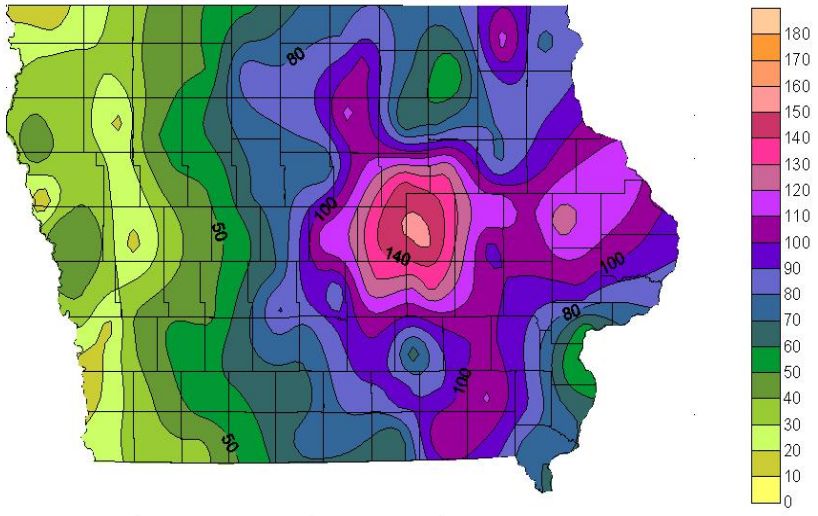
Crew Phase I & Phase II Hours (Pay Period)*



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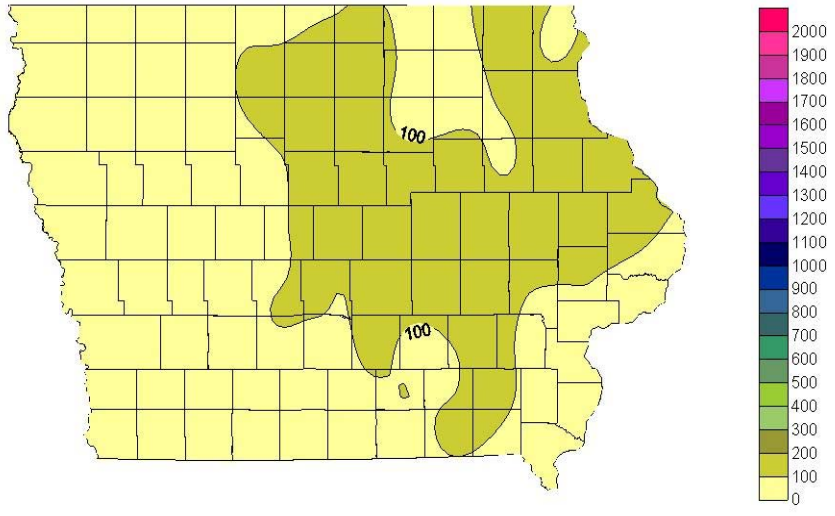

PRELIMINARY 12-11-08

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